EXPORTS AND ECONOMIC GROWTH;
A Comparison between Indonesia and Singapore.

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Introduction

Much empirical evidence suggest that countries with high growth export rates tend to enjoy a high economic growth. Increasing the volume of exports directly increases national income through a national income equation. A recent theory suggests that exports increase national income indirectly through spill over effects that improve income and reduction costs. The indirect effect of exports was described by Balasa as follows:

> Exports provide incentive to sales in domestic and foreign markets, lead to resources allocation according to comparative advantage, allow for capacity utilization, permit the exploitation of economic of scale, generate technological improvements and contribute to increased employment. (Balasa, 1978).

In addition to verifying the existence of the spill over effect, this statement implies that there are substantial difference in the marginal factor productivity between export-oriented and non export oriented sectors of the economy. The models that will be developed later in this paper will emphasis these differences.

This paper attempts to investigate the role of exports in explaining the growth of the economy, both directly and indirectly, in two countries Singapore and Indonesia, following the economics model developed by Feder, 1982, based on the framework anlysis developed by previous authors in these fields (Michalopoulos and Jay, 1973 and Balasa, 1978). The paper starts by presenting a short description of the economic background of Indonesia and Singapore (in section 2). Section 3 discusses the

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anlytical framework and econometrics models used in this investigation, and section 4 presents the empirical analysis and comparison of the results in this two cases.

The Economic Background of Indonesia and Singapore

Before 1969, Indonesia was a closed economy, and the role of exports was insignificant. After Indonesia adopted an open door policy in 1969, exports started to grow - exports which were dominated by the export of primary products (rubber, coffee, tea, tin, oil etc). At its peak (1981), the export of primary products accojunted for about 45 percent of the value added and 85 percent of the Indonesian export earnings. Increasing the price of oil in 1974-1982 has increased the share of export in the national economy significantly, due its role in increasing the value of exports.

After 1983, the Indonesian economy suffered from these "external shocks": the decreasing the price of oil, the weakening of the international market and the weakeing value of the US dollar. In 1983, the value of exports was US$ 29.9 billion, in 1985 it dropped to US$ 10.5 billion. In 1987, due to the economic recovery policy launched by the government, exports increased to US$14.0 billion but never reached the export value of 1983. Still, the goverment adjustment programs implemented as a response to the external shocks have been able to increase the non oil manufacturing exports.

In the 1970's, the Singapore economy grew by an average 11.2 percent per annum. In the 1980's, Singapore moved into its "second industrial revolution", by which raised the wages by an average of 20 percent. The high wage and manpower training policies were aimed at increasing labor productivity and moving the economy from a labor intensive one to a more capital intensive economy. Like Indonesia, Singapore experienced an economic recession in 1985, when the rate of economic growth was only -1.6 percent. The economic recovery implemented in 1986 was able to increase the rate of growth to 8.8 percent by 1987. Exports contribute significantly to the Singapore's economy; in 1987 exports contributed S$28.6 billion of the GDP's S$41.9 billion.

The Analytical Framework

The economic model which explains exports as a source of economic growth was developed by Feder, 1982, and is basically a synthesis of studies by Balasa, 1978, Chennery, 1970 and Michalopoulos and Jay, 1973. The model assumes that the economy consists of two sectors: producing export goods sector (X) and producing domestic goods sector (N). The economy of sector X has a spill over effect on sector N. The effects are referred to externalities, since they are not reflected in the market prices. These two sectors of the economy, with externalities, can be formulated as follows:

$$N = F (Kn, Ln, X) \quad [1]$$

$$X = G (Kx, Lx) \quad [2]$$

Where

$$Y = N + X \quad [3]$$

Y - the value of Gross Domestic Product (GDP)

N - non-exports sector

X - export sector

Kn and Kx are capital stock in the respected sectors

Ln and Lx are labor force in the respected sectors

The externality is represented by variable X in [1]. A direct estimation of the role of exports in the growth of the economy using equation [1] - [3] is not possible, because the national data of the variables K and L are rarely broken down into Kn, Kx, Ln, Lx. Therefore, another method of estimation must be found; such method will be discussed in the remainder of this section.

The neo-classical economic theory argues that the optimum allocation between labor and capital under perfect competition, in the absence of externalities, is as follows:[1]

[1] This theory has been discussed in many intermediate micro economic textbooks.

$$(Gk / Fk) = (G1 / F1) = (1 + \delta)$$

where G and F are the marginal productivity of factors and the value of δ = o. Bruno, 1968 and Keesing, 1978 argued that inmost developing countries that the value of $\delta > 0$, which mean that the marginal productivily is higher in the sector X than in the sector N.

Differentiation of equation [1] - [3] yields:

$$N = Fk.In + Fl.Ln + Fx.X \qquad [5]$$

$$X = Gk.\ Ix + G1.Lx \qquad [6]$$

$$Y = N + X \qquad [7]$$

where In and IK are the sectoral gross investment; Ln and Lx are the rate of labor force growth in respective sectors and F and G are the marginal productivity of factors. The variable which we are interested in this paper is the variable Fx in equation [5] which is the marginal efficiency effect of exports on the output of the non exporting sector, as a result of externality.

Substituting the equation [4] - [6] into [7] and following the argument by Bruno (1968), which assumes that a linear relationship exists between real marginal productivity of labor (Fl) and average labor productivity in the economy, result in :

$$Fl = \beta\ .\ (Y/L) \qquad [8]$$

which will, after some manipulation yield the following equation:

$$Y/Y = \alpha\ .\ I/Y + \beta\ .\ L/L + \left(\frac{\delta}{1+\delta} + Fx\right).\ X/X.X/Y \qquad [9]$$

where, Y/Y, L/L and X/X are the rate of growth of the GDP, labor and export respectively; and I/Y is the share of investment to GDP and X/Y is the share of export in the GDP, and is the parameter originated from equation [4]. The detailed calculation used to arrive at the equation [9] can be seen in Appendix 1.

From [9], we can see if the value of δ = o and Fx = o (which means no externality exist between the two sectors), then [9] becomes the neoclassical production function, which explains output as a function of capital and labor. Following the explanation of equation [4], it is argued that the term (δ/(l+δ+Fx) is likely to have a non-zero value. The term should be interpreted as the marginal productivity of capital (MPK) in the non export sector, rather than the MPK of the whole economy (see Feder, 1982, pp.6). Equation [9] indicates that the rate of growth of the GDP is composed of the capital accumulation, the growth of the labor accumulation, and the spill over effects represented by the share of the exports in the GDP multiplied by the rate of growth of exports. Shifting the factor of production from low labor productivity (in the non export sector) to high the productivity sector of the exporting sector also explains the contribution to the growth of the GDP.

The Main Model

For the econometrics application, equation [9] can be converted into the following econometrics model:

$$y = \alpha sI + \beta n + \tau (x. sx) + e \qquad [10]$$

where y - rate of growth of the GDP

si - the share of investment in the GDP

n - the rate of growth of the labor force

sx - the share of exports in the GDP

e - the random terms.

The value of α, the marginal productivity of capital, is expected to be positive. The parameter τ , represents the differential productivity of factors, the value should be positive and significantly more than zero. And the parameter should be greater than zero if a labor surplus is not a prevalent factors in the country.

The Extended Model

The extended model elaborates upon the coefficient Fx from equation [9], in order to explain more of the marginal productivity differential due to externalities discussed in the previous section. The justification of the expended models is explains in this section.

From equation [1]:

$$N = F(Kn, Ln, X) = X.(Kn, Ln)$$

Following equation [8], the marginal productivity of output as a result of externalities is

$$dN/dX = Fx = \theta \, . \, N/X \qquad [11]$$

and substituting [11] into [9] yields :

$$Y/Y = \alpha \, I/Y + \beta L/L + [\, \delta/(1+\delta) - \theta].X/X.X/Y + \theta.X/X \qquad [12]$$

Equation [12] can be converted into:[2]

$$Y/Y = \alpha \, I/Y + \beta L/L + [\delta/(1+ \delta) - \theta].X/X.X/Y + \theta.X/X \qquad [13]$$

The notation of the variable and parameters are the same as previous notations. Therefore from [13], the econometrics equation for the extended model is as follows :

$$y = \alpha \, sI + \beta n + \tau x. \, sx, + \theta \, x + e \qquad [14]$$

where $\tau = [\, \delta/(1+ \delta) - \theta]$, and other notation the same as in equation [10]

[2] This is because $\theta.N/X = N/X \, / \, X/Y = \theta \, [1 - (X/Y)] \, / \, X/Y = \theta \, (X/Y) - \theta$.

From [14] we can see that the contribution of exports to the GDP growth rate can be broken down into two components: (i). the gain due to externalities from the exporting sector into the non exporting sector, equation θ . x, and (ii). the gain through high productivity in the exporting sector, equation (δ/(l+δ), x. sx. The expected signs of the parameters are the same as in the main model.

Empirical Estimates

The empirical estimate attempts to compare the source of the growth of the GDP from exports between Indonesia, which is a primarily product-oriented and oil-dominated country and Singapore which is manufacturing oriented product economy. Primary investigation toward applying the models for Indonesia which are based on national aggregate data, which include oil as an export component, did not provide statistically significant results. Therefore, the empirical estimation in this paper uses the data exclude oil from the export figures.

Both methods estimation use the time reference 1970-1986. The source of the data for Indonesia is the national income account statistics from the Central Bureau of Statistics (Indonesia). For Singapore, the data source is the Asian Development Bank. The Indonesian figures are adjusted by the following: (i) two years series of data, 1981 and 1986 are excluded from the observation, because in these two years Indonesia experienced an external shocks, which cause exports to drop by more than 50 percent in 1981 and by more than 8 percent in 1986, while the rate of growth of the GDP was still positive; (ii) foreign aid is added to the investment data before 1976, because the under valued investment in these years. There is no change in the Singapore's data.

The result of the empirical estimate is presented in Table 1 for the main model and in Table 2 for the extended model. From these two tables we can see that the empirical estimates for Indonesia do not yield a promising result. In addition, the main model seems better suited for both countries than the extended model.

From Table 1, for Singapore, the rate of growth of the GDP (y) was greatly influenced by the share of investment in the GDP (I/Y). And the growth of the labor force (n) contributes to the growth of the GDP by 0.82. The effect of "*externalities*" of export to the growth of the GDP was 0.24 and statistically signigicant. Feder, 1982, found out the value of τ was .42 for the extended sample and .39 for the limited sample.[3] Therefore the parameter τ for Singapore is a little too low. The differences in the period of studies - Feder's study was using data from 1964-1973, while this study is based on the period 1970-1986 might contribute to these diffrences; especially important is the slow export growth in the 1980's. The application of the extended model to the Singapore's economy does not provide a statistically significant result.

The application of the main model to the Indonesian economy yields a statistically significant estimation (see Table 1), but the parameter estimate is much too high. The a coefficient is 9.2, which means the role of investment in the economic growth is negative.

This indicate a strange result. While coefficient p = 1.224 and x = 1.951 are much too high compared with the Feder study. The application of the extended model to the Indonesian economy (see Table 2) does not yield a statistically significant result. But the result of the parameter estimate is quite reasonable: the externality effect 0.94 and the direct effect of exports on the growth of the GDP was 0.22. The explanation of the statistically insignificant result in the case of the Indonesian economy may be due to the following:

(i) the Indonesian exports have been comprised of primary products; the variation of interfiational prices causes the export value to fluctuate, which, in many cases means the fluctuation is inversely related with the growth of the GDP,

(ii) the changes of the quota of the primary products in the international market, causes the fluctuation of the export growth.

Table 1

[3] The limited sample consists of 19 semi-industrial countries and the extended sample consists of 32 mix-countries.

Empirical Estimates of the Main Model

Parameters	Singapore	Indonesia
Intercept	-19.8 (0.1751) a/	0.56 (0.8981)
I/Y	56.74 (0.0942)	-9.2 (0.124)
L/L	0.820 (0.059)	1.224 (0.0087)
X/X.X/Y	0.283 (0.0092)	1.951 (0.001)
Durbin Watson St. Number of Obs.	1.231 16	2.432 16

a/ the probability !T!>0

Table 2
Empirical Result of the Extended Model

Parameters	Singapore	Indonesia
Intercept	-19.789 (0.2126)a/	4.167 (0.4431)
I/Y	56.676 (0.1199)	-32.04 (0.3298)
L/L	0.814 (0.4786)	1.430 (0.0062)
X/X.X/Y	0.242 (0.498)	0.945 (0.3153)
X/X	-0.005 (0.99)	0.220 (0.2675)
Durbin Watson St Number of Obs	1.228 16	2.223 16

a/are the probability :T: >0

This fluctuation of the rate of growth of exports is independent of the rate of growth of the GDP. Furthermore, it causes the value of the variable X. X/Y to move up and down which is inversely related to the smooth rate of growth of the GDP.

Conclusion

This paper attempts to investigate the role of export in the growth of the gross domestic products of Indonesia and Singapore. The framework of analysis uses the economic model developed by Feder, 1982, which identifies the direct effect and the spillover effects (externality effect) of the two sector models, the exporting and non-exporting sector. The application of the model to Singapore yields a coefficient of 0.23 for the externality effect of exports on the rate of growth of the GDP. On the other hand, the application to the Indonesian economy does not yield statistically significant result, because export growth does not seems related to GDP growth. This finding seems the contrary to the economic norms, but since Indonesian exports is determined very much by the external factors, this finding would be reasonable.

The economic analysis used in this paper is typical of neoclassical economic models which have been very "intellectually stimulating" models; it gives clear an understanding of the behavior of the economy but does not contribute to the economic policy.

Appendix 1.

Substituting equation [5] and [6] into [7], yields:

$$Y = Fk.\ In + Fl.Ln + Fn.X + Gk.\ Ix + Gl.Lx \qquad [i]$$

Since $Gk + (1+\delta)\ Fk$ and $Gl = (1+\delta).\ Fl$, from equation [4], then

$$Y = Fk.\ In + Fl.\ Ln + Fri\hat{}X. + (1+\delta)\ Fl.\ Ix + (1+\delta)\ F1.LX$$

$$= [Fx.In + (1+\delta).Fk.\ Ix] + [Fl.Ln + (1+\delta)\ Fl.\ Lx] + Fx.X$$

$$= Fk\ (In + Ix) + Fl\ (Ln + Lx) + Fx.X + \delta\ (Fk.Ik.Fl, Lx) \qquad [ii]$$

Since the total investment $I = (In + Ix)$ and the total labor force growth is $L = (Ln + Lx)$, then combining them with equation [4] and [5], result in :

$$Fx\ Ix + Fl.Lx = 1/(1+\delta).\ (Gk.\ Ik + Gl.\ Lx) = x/(l+\delta) \qquad [iii]$$

Substituting I and L into (ii), yields:

$$Y = Fk.\ I + Fl.L + \{\ \delta/(1+\delta) + Fx\}.\ X \qquad [iv]$$

Since $Fl = \beta\ .\ (Y/L)$ from equation [8], dividing (iv) by Y and denoting $Fk = \alpha$, yields

$$Y/Y = \alpha\ I/Y + \beta\ (L/L) + \{\delta/(1+\delta) + Fx\}\ .\ X/X\ .\ X.Y \qquad [v]$$

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